

DEPARTMENT OF COMMERCE.

BUREAU OF STANDARDS.

George K. Burgess, Director.

SUPPLEMENT TO CIRCULAR NO. 25.

[March 3, 1924.]

STANDARD SAMPLES ISSUED OR IN PREPARATION.

The samples are listed by groups; the sample numbers represent the order of issuance of the first representative of each kind. Renewals of an analyzed sample are indicated by the original number, with an added letter to denote its intended relation. Thus, 10a is the first, 10b the second, and 10c the third renewal of No. 10 Bessemer 0.4 C steel. In this way a given number will always represent a material of fixed or approximately fixed composition. Numbers missing from the series in the following table represent samples of which the supply has become exhausted and which it is not the present intention to replace. Special attention is called to changes in the weight of and fees charged for many of the samples as compared with the figures of previous issues of this supplement.

ORDERING.—Orders should give both the number and name of the sample wanted. Example: No. 9b, steel, Bessemer, 0.2 C. The list of standard samples, their numbers, prices, and analyses are to be found in the succeeding pages. No samples of smaller size than those listed are distributed.

TERMS AND SHIPPING.—(a) *Domestic*.—Samples may be paid for in advance with order. If remittance does not accompany the order, all samples will be sent under Government frank by parcel post C. O. D. in the United States and its possessions. It is, therefore, important that firms with branch laboratories send remittance with order if the laboratories can not receive C. O. D. packages. Both the central office and branch laboratory will be notified when shipment is made. No discounts are allowed on any orders.

(b) *Foreign*.—All foreign shipments require prepayment. With the exception of Mexico and Canada 20 cents postage must be added for every 300 grams of sample. Shipments intended for Mexico and Canada will be sent under Government frank, but not collect on delivery.

(c) Money orders, etc., should be payable to the Bureau of Standards.

DESCRIPTIVE LIST OF STANDARD SAMPLES, WITH SCHEDULE OF WEIGHTS AND FEES.

Sample number.	Name.	Constituents determined or intended use.	Weight of sample in grams.	Fee per sample.
1	Argillaceous limestone	Complete analysis	50	\$0.75
2	Zinc ore D	Zinc	50	.75
25a	Manganese ore	Manganese, available oxygen	100	2.00
26	Crescent iron ore	Al ₂ O ₃ , CaO, MgO	100	2.00
27a	Sibley iron ore	SiO ₂ , P, Fe	125	2.00
28	Norrie iron ore	Mn (low)	50	1.00
29	Magnetite iron ore (titaniferous)	Complete analysis	50	1.00
56	Phosphate Rock	P ₂ O ₅ , Fe ₂ O ₃ , Al ₂ O ₃ , etc.	65	2.00
4c	Cast iron	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
5d	Cast iron (iron C)	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
6c	Cast iron (iron D)	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
7a	Cast iron (iron E)	C, Mn, P, S, Si, Ti, (Cu, Ni, Cr, V)	150	2.50
55	Ingot iron	C, Mn, P, S, Si, Cu, Ni	150	2.00
8b	Steel, Bessemer, 0.1 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
9b	Steel, Bessemer, 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
10c	Steel, Bessemer, 0.4 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
22a	Steel, Bessemer, 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
23a	Steel, Bessemer, 0.8 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
15a	Steel, B. O. H., 0.1 C	C, Mn, P, S, Si, (Cu)	150	2.00
11c	Steel, B. O. H., 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V, As)	150	2.00
12c	Steel, B. O. H., 0.4 C	C, Mn, P, S, Si	150	2.00
13b	Steel, B. O. H., 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr)	150	2.00
14b	Steel, B. O. H., 0.8 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
16a	Steel, B. O. H., 1.0 C	C, Mn, P, S, Si, (Cu, Cr)	150	2.00
19b	Steel, A. O. H., 0.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
20b	Steel, A. O. H., 0.4 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
21b	Steel, A. O. H., 0.6 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
34	Steel, A. O. H., 0.8 C	C, Mn, P, S, Si, (Cu, Cr, Mo)	150	2.00
35	Steel, A. O. H., 1.0 C	C, Mn, P, S, Si, (Cu, Cr)	150	2.00
51	Steel electric furnace, 1.2 C	C, Mn, P, S, Si, (Cu, Ni, Cr, V)	150	2.00
30b	Steel, chrome-vanadium	C, Mn, P, S, Si, Cr, V (Cu, Ni)	150	3.00
32a	Steel, chrome-nickel	C, Mn, P, S, Si, Cr, Ni (Cu)	150	3.00
33a	Steel, nickel	C, Mn, P, S, Si, Ni, (Cu, Cr, V)	150	3.00
50	Steel, chrome-tungsten-vanadium	C, Mn, P, S, Si, W, Cr, V (Cu, Mo)	150	3.50
57	Refined silicon	Complete analysis	60	2.00
58	Ferro-silicon (75% silicon)	do	75	2.00
59	Ferro-silicon (50% silicon)	do	75	2.00
60	Ferro-vanadium (low carbon)	do	100	3.00
61	Ferro-vanadium (high carbon)	do	100	3.00
37b	Brass, sheet	do	150	3.00
52	Bronze, cast	do	150	3.00
53	Lead-base bearing metal	do	200	3.00
54	Tin-base bearing metal	do	200	3.00
62	Manganese bronze	do	150	3.00
63	Phosphor-bronze bearing metal	do	150	3.00
42a	Tin	Melting point 231.9° C	350	2.00
43a	Zinc	Melting point 419.4° C	350	2.00
44a	Aluminum	Melting point 658.9° C	200	1.00
45a	Copper	Melting point 1083° C	450	2.00
49	Lead	Melting point 327.3° C	1650	2.00
46i	Cement (normal)	Fineness (testing sieves)	160	.50
47c	Cement (extra fine)	do	160	.50
40b	Sodium oxalate	Oxidimetric value	60	2.00
17	Sucrose	Calorimetric and saccharimetric values	60	2.00
38a	Naphthalene	Calorimetric value	50	2.00
39b	Benzoic acid	Acidimetric or calorimetric value	30	2.00
41	Dextrose	Reduction value	70	2.00

SUMMARY OF ANALYSES.

In general, the values here given represent the averages of all determinations. In certain cases, for reasons explained on the certificates, other values are given in these tables and are recommended by the Bureau of Standards.

AVERAGED ANALYSES.

IRONS.

Number.	Total carbon.	Graphite.	Combined carbon.	Manganese.	Phosphorus (gravimetric).	Phosphorus (alkali titration).	Sulphur by oxidation.	Silicon.	Titanium.	Copper.
4c.....	2.74	2.13	0.61	0.897	0.080	0.080	0.075	1.26	0.035	0.235
5d.....	2.58	1.97	.61	.815	.230	.231	.049	1.83	.077	.093
6c.....	2.62	1.72	.87	1.46	.434	.428	.043	2.41	.062	.161
7a.....	2.34	1.98	.36	.444	.844	.836	.050	2.20	.096	.021
55.....	0.013			.019	.003	.004	.017	.001		.041

STEELS.

Number.	Kind of sample with approximate carbon content.	Carbon, direct combustion.	Manganese.	Phosphorus.	Sulphur.		Silicon.
					By oxidation.	Evolved as hydrogen sulphide.	
	Bessemer.						
8b.....	0.1						
9b.....	.2						
10c.....	.4	0.414	1.13	0.106	0.038	0.038	0.093
22a.....	.6	.577	.794	.119	.100		.149
23a.....	.8	.885	.634	.102	.038	.035	.160
	Basic open-hearth.						
15a.....	0.1						
11c.....	.2	0.214	0.435	0.005	0.033	0.033	0.009
12c.....	.4						
13b.....	.6						
14b.....	.8	.817	.493	.008	.031	.031	.009
16a.....	1.0						
	Acid open-hearth.						
19b.....	0.2	0.202	0.462	0.043	0.025	0.025	0.146
20b.....	.4	.402	.637	.063	.040	.040	.175
21b.....	.6	.605	.564	.064	.036	.036	.162
34.....	.8	.84	.70	.095	.029	.029	.18
35.....	1.0	1.03	.30	.033	.027	.027	.17
	Electric furnace.						
51.....	1.2	1.29	0.271	0.011	0.013	0.014	0.250

ALLOY STEELS.

Number.	Kind.	Carbon, direct combustion.	Manganese.	Phosphorus.	Sulphur.	Silicon.	Nickel.	Chromium.	Vanadium.	Tungsten.
30b	Chrome-vanadium	0.290	0.805	0.020	0.033	0.228	0.121	1.02	0.21	.....
32a	Chrome-nickel.....	.396	.244	.020	.017	.11	1.57	.89	.....	.....
33a	Nickel.....	.299	.456	.027	.030	.124	3.24	.197	.....	.....
50	Chrome-tungsten-vanadium.....	.66	.20	.028	.031	.16	.....	3.62	.76	17.5

AVERAGED ANALYSES—Continued.

FERRO-ALLOYS.

Number.	Kind.	Sili- con.	Car- bon.	Man- ganese.	Phos- phorus.	Sul- phur.	Tita- nium.	Alum- inum.	Cal- cium.	Iron.
57	Refined silicon.....	95.8	0.09	0.034	0.007	0.005	0.10	0.67	0.75	0.65
58	Ferro-silicon (75% Si).	75.6	.033	.16	.016	.01	.09	.80	.45	22.4
59	Ferro-silicon (50% Si).	50.0	.015	.31	.034	.01	.11	1.00	.04	43.3

Number.	Kind.	Vana- dium.	Car- bon.	Man- ganese.	Phos- phorus.	Sul- phur.	Sili- con.	Alum- inum.	Molyb- denum.	Iron.
60	Ferro-vanadium (low carbon).....	33.55	0.24	3.38	0.055	0.105	1.30	12.5	0.90	47.1
61	Ferro-vanadium (high carbon).....	31.15	1.16	3.55	.243	.003	7.75	.02	.72	52.84

SHEET BRASS.

Number.	Copper.	Zinc.	Tin.	Lead.		Iron.	Nickel.
				PbSO ₄ method.	PbO ₂ method.		
37b.....	70.36	27.08	0.99	0.89	0.91	0.21	0.45

BRONZES.

Number.	Kind.	Copper.	Tin.	Zinc.	Lead.	Iron.	Nickel.	Anti- mony.	Man- ganese.	Alum- inum.
52	Cast.....	88.33	7.88	1.89	1.53	0.12	0.13	0.15	.....	.....
62	Manganese.....	59.06	.81	35.06	.57	1.13	.63	.....	1.60	1.13

BEARING METALS.

Number.	Kind.	Lead.	Tin.	Anti- mony.	Bis- muth.	Copper.	Iron.	Arsenic.	Phos- phorus.	Zinc.
53	Lead-base.....	78.87	10.91	10.09	0.06	0.05	0.05	0.02	.....	.....
54	Tin-base.....	.55	88.20	7.32	.06	3.75	.05	.05	.....	.....
63	Phosphor-bronze.....	9.74	9.9	.54	.....	78.1	.30	.20	0.65	0.50

ARGILLACEOUS LIMESTONE.

[Cf. J. Am. Chem. Soc., 28, p. 223; 1906.]

Number.	SiO ₂ .	TiO ₂ .	Al ₂ O ₃ .	P ₂ O ₅ .	Fe ₂ O ₃ .	MnO.	CaO.	MgO.	K ₂ O.
1.....	18.15	0.22	5.70	0.18	1.72	0.04	37.65	1.94	1.15

Number.	Na ₂ O.	H ₂ O 100°-.	H ₂ O 100°+.	S.	SO ₃ .	CO ₂ .	C.	Total.	Ign loss.
1.....	0.33	0.16	1.51	0.27	0.013	30.68	0.65	100.25	32.27

ZINC ORE.

[Cf. J. Am. Chem. Soc., 29, p. 262; 1907.]

Number.	Zinc— general average.
2.....	31.43

AVERAGED ANALYSES—Continued.

MANGANESE ORE.

Number.	Total manganese.	Available oxygen.	Calculated MnO ₂ .
25a.....	56.3	16.10	87.50

LAKE SUPERIOR IRON ORES.

Number.	Name.	SiO ₂	TiO ₂	P	Al ₂ O ₃	Fe	Mn	CaO	MgO
26.....	Crescent.....	¹ 5.03	¹ 0.07	¹ 0.040	1.02	¹ 58.62	.....	2.56	3.27
27a.....	Sibley.....	1.02	.....	.039	.....	68.57	.....	.....	.....
28.....	Norrie.....	.....	.....	.....	.....	.....	0.465	.....	.....

¹ Values derived from a small number of determinations at the Bureau of Standards and not so well established as the other values.

MAGNETITE IRON ORE.

Number.	SiO ₂	TiO ₂	Al ₂ O ₃	V ₂ O ₅	FeO	Fe ₂ O ₃	Fe	MnO
29.....	12.02	0.99	1.91	0.08	24.78	52.20	[55.75]	0.09

Number.	CaO	MgO	K ₂ O	Na ₂ O	H ₂ O+	CO ₂	P ₂ O ₅	S
29.....	2.90	2.01	0.51	0.45	0.47	0.68	1.01	0.025

TENNESSEE PHOSPHATE ROCK.

Number.	Total P ₂ O ₅	Total Fe ₂ O ₃	Total Al ₂ O ₃	CaO	MgO
56.....	31.33	3.30	3.1	44.8	0.40

PURE CHEMICALS.

SUGARS.

Number.	Name.	Moisture.	Reducing substances.	Ash.
17.....	Sucrose.....	<0.01	<0.003	<0.003
41.....	Dextrose.....	<.05	.....	<.003

NAPHTHALENE.

Number.	S	
38a.....	<0.05	Cf. method of purification, p. 11, Circular No. 25.

BENZOIC ACID.

Number.	
39b.....	No impurities could be detected. Cf. method of purification, p. 10, Circular No. 25.

SODIUM OXALATE.

Number.	Water.		NaHCO ₃	S	K	Fe	Cl	Organic impurity.
	105°	240°						
40b.....	0.008	0.036	0.06	None found...	None found...	None....	<0.002	None.

GENERAL INFORMATION.

(a) **BOTTLING.**—Iron, steel, and ore samples are sent in screw-capped glass bottles and organic samples in glass-stoppered bottles under seal.

(b) **LITERATURE.**—Detailed certificates of analysis accompany all samples. Gummed labels with the summary of analysis are also furnished with most samples. Circulars containing information on certain samples may be obtained upon request. In the case of new or renewed samples provisional typewritten certificates will be supplied until they can be replaced by the printed certificates and labels when ready.

(c) **SAMPLES OUT OF STOCK.**—The preparation of “Renewal” samples is intended to be complete at the time each kind of sample becomes exhausted, but owing to delays encountered in obtaining a proper grade of material and for other reasons this is not always possible. If orders are received for samples that are out of stock, notice will be mailed to that effect. The “Renewal” of an analyzed sample will have a composition more or less different from that of its predecessor, but as regards the characteristic constituent or constituents will pattern after it closely.

(d) **NEW SAMPLES.**—When new samples or renewals of old ones are issued, announcement will be made in scientific and trade journals.

(e) **MIXING.**—In order to overcome the effect of any segregation of granular samples in shipment, the contents of each bottle (except the organic samples) *should be thoroughly mixed before any is used for analysis.*

NOTE.—This supplement replaces the supplement issued March 2, 1923. It supersedes all previous supplements and is effective on the date of issue hereof.

GEORGE K. BURGESS,
Director.

Approved:

HERBERT HOOVER,
Secretary of Commerce.